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## CLINICAL NOTES OF CASES.

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**CASE I.**—Some ten years ago Mrs. B. had an eye removed, and in a few days an artificial one was placed in the cavity. The first eye was afterward broken, and another was introduced. This breakage and substitution continued, and with it the dimensions of the cavity grew less and less, until finally the difference between the two eyes was so great as to render the woman unsightly. The shrinkage was no doubt brought about by introducing eyes that were too small, and improperly fitted. She applied to a surgeon who proposed to operate and increase the size of the palpebral fissure. At first this looked to be the rational method of procedure. However, it seemed impossible to increase the size of such an opening by any cutting operation, and leave it in such a condition as would render it possible to retain an artificial eye. Being thoroughly satisfied that a cutting operation would fail, I advised her to pack the cavity with wet cotton wool, and to place a bandage over it, changing the cotton once in twenty-four hours. This produced so much irritation that it had to be abandoned. It was thought that she might be able to wear the eye reversed, i. e., turning the concave surface

forward, filling it with wet cotton wool, and applying a compress. This worked like a charm, giving her no inconvenience. In a month the cavity was so much increased in size as to make it possible for her to wear an eye almost as large as the natural one. There was but little difference, and notwithstanding the fact that she was a fastidious woman, she was satisfied.

CASES II and III.—In a recent issue of your Journal, I notice the report of some cases of conjunctival tumors containing a growth of hair. I reported two such cases in the *Medical Herald* a few years since, and now send you an extract of the report with the important points connected with the cases.

The first case was in the person of a boy about fifteen years of age. The tumor was located on the ocular conjunctiva of the upper and outer portion of the left eye, and was about the size of a small hazel-nut. It seemed to be lying loosely between the conjunctiva and globe.

Growing from the upper surface of the tumor, near its centre, were three long hairs, one of them measuring more than two inches in length: the hair resembled that of the beard, with the exception that it was curled up into a perfect ringlet. The tumor gave but little inconvenience, aside from the excessive flow of tears over the cheek.

The conjunctiva was laid open and the tumor removed by dissecting it out of the loose tissues. The wound was closed with silk sutures, and, in the course of a few days the patient was sent home and has had no trouble since.

The second patient was a little girl, some six years of age: the tumor was in the same locality as in the former case, and about the same size, and had three hairs growing from its top, or lid-surface. The hairs in this case, were not so long as in the first. I advised the father to have the growth removed, but he declined, and I have not heard from the case since.

CASE IV.—John B., a striker in a plow factory, while engaged at his occupation in 1879, a small piece of steel flew from the hammer and passed through the sclera of the right eye, entering just outside the cornea, in the horizontal meridian on the temporal side.

I saw him on the day following the accident, and detected the

piece of steel attached to the posterior surface of the lens. It had undergone no change and still retained its *bright reflex*. The lens showed signs of inflammation, and there was considerable photophobia. I advised him to protect the eye, and use a solution of atropia and morphia, and bathe the eye in cold water. There was considerable ciliary irritation accompanying the injury; the lens became cataractous, but did not undergo absorption. The irritation gradually subsided, and the cataract remained unabsorbed. I saw the patient a short time since and found the cataract unchanged, and the piece of steel still in its former position. The patient is able to distinguish light with the injured eye, showing that the retina is still in a condition to receive impressions. This case illustrates the tolerance of a foreign body within the globe.

## SOME THOUGHTS ON ASTIGMATISM OF CURVATURE.

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BY H. CULBERTSON, M. D.,  
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Observation and a consideration of authority have led me to believe that the crystalline lens takes part in the induction of regular astigmatism as well as the cornea. Just how the longitudinal, oblique or circular fibres of the ciliary muscle effect, this, acting upon the lens, has not, so far as I am able to determine, been satisfactorily shown by the many able authorities consulted. As to the *modus operandi* of accommodation also, those who have investigated this subject most closely, draw diverse conclusions. Hence as to both of these themes we can only draw inferences from practical demonstrations and phenomena.

Speaking of astigmatism, the results of states of the "*crystalline*" (lens), Dr. E. Landolt, says<sup>1</sup> "The '*crystalline*' (lens) often takes part in the induction of regular astigmatism, at times in a passive, and again in an active manner. The first case is recognized when the ocular globe, at least its anterior part, is less convex in one direction. Then the '*crystalline*,' flattened, so to say, in one meridian, will approach the conformation equally flattened of the cornea, and the static crystalline astigmatism will be directly added to that of the cornea. Again the principal meridians of the astigmatic lens may not have the same direction as those of the cornea; at another time they are parallel, but in such a manner that the maximum of curvature of the crystalline corresponds to the minimum of that of the cornea; and the meridians least convex of the lens are in the same direction as those the most convex of the cornea. It is thus that the crystalline

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1. See Landolt. *La Réfraction et l'Accommodation de l'Oeil*, p. 291.



astigmatism may compensate, partially, or totally, for that of the cornea, or even may exceed it in degree.

Based upon numerous measurements and calculations, Donders, had already formulated this important conclusion, in 1864, in saying that with a high degree of asymmetry of the cornea there is found also an asymmetry of the crystalline which acts in such a direction that the total astigmatism of the eye is almost always inferior to that of the cornea.<sup>1</sup> This lens astigmatism, the inverse of the corneal, is more frequently what may be called active or dynamic, and due to an unequal contraction of the ciliary muscle, which causes the lens to become more rounded in one direction than another, and in the interest exactly of a correction of an astigmatism of the cornea. It was Dobrowolsky, who discovered this fact, which is supported by numerous proofs in his work.<sup>2</sup>

We are able, at once, easily to detect that the eye is able to overcome, by a certain effort, feeble cylindrical glasses. By what mechanism will it be possible to neutralize the unequal contraction of the ciliary muscle followed with a corresponding change in the form of the crystalline lens? This muscular action, unusual and against nature in a non-astigmatic eye, is otherwise revealed by a sensation quite disagreeable, and which by its resemblance to that which we experience in fixing the punctum proximum, admits of no doubt as to its origin. On the other hand Hensen and Voelckers, have proved, by experiments on animals, and by clinical observation that, when there is a lesion of a single branch of the ciliary nerves, its excitation will cause a contraction of a distinct part of the isolated sphincter of the iris and of the fibres of the ciliary muscle. The contraction of the muscle limited to one meridian, causing the crystalline to relax unequally and making the lens take a form more convex in one meridian only.

But the most conclusive proofs are the clinical observations of

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1. Donders, *Accom. and Refract.* Eng. Ed. p. 492. Germ. ed. 416.

2. See his work. *Ueber verschiedene, Veraenderungen des Astigmatismus unter dem Einflusse der Accommodation.* (Arch. fuer Ophth. XIX., III., p. 51, 1868.

M. Dobrowolsky, and of all those who have repeated his experiments.<sup>1</sup>

In paralyzing the accommodation by the energetic and prolonged use of atropine, we sometimes detect regular astigmatism where there was no trace of it before using the agent, or when the accommodation was intact. The mydriatic exercising no influence upon the cornea, but only upon the form of the crystalline through the agency of the ciliary muscle, we are forced to admit that the astigmatism which becomes manifested by the employment of the atropine, is due to the cornea, and has been masked, neutralized, and corrected by the unequal contraction of the ciliary muscle, and the form of the lens, which is astigmatic in the inverse direction to that of the cornea.

In other cases an astigmatism already detected in the normal state, augments as a result of the paralysis of accommodation. This proves that the irregularity of the corneal curvature has only partially compensated that of the crystalline.

At other times, finally, the astigmatism changes in direction under the influence of the mydriatic, that is to say, the meridian of greatest refraction before the instillation of atropine presents the minimum of refraction after its use, and inversely. In this case the corneal astigmatism was over-corrected by that of the crystalline, due to the action of the ciliary muscle. Without having recourse to the mydriatic, the latent astigmatism is revealed in some with the ophthalmoscope, the attending spasm of the ciliary muscle ceasing during the examination.

We have said above, that the difference in the two meridians, perpendicular to each other, may on looking obliquely through a spherical lens, induce astigmatism, or in other words, when the axis of the lens does not correspond with that of the eye, or when it is not centered in relation to it. We have said, also (p. 112, loc. cit.) that such a manner of adapting lenses to the eye is desirable at times. This irregularity, neglectable in most cases,

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1. Mauthner. *Die Optischen Fehler*, etc., p. 734, 1876. Javal et Schiøtz, *Un Ophtalmomètre pratique* (*Ann., d'oc.*, Juillet, 1881, p. 1). Landesberg, *Ueber das Auftreten von regelmaessigem Astigmatismus*, etc. (*Arch. fuer Ophth.*, xxvii, ii, p. 89, 1881.)

may attain a degree so elevated as to produce a manifest astigmatism. It is thus that Donders detected, in his own eye, a regular astigmatism, attributable to a slight inclination of the crystalline, and also in another case, observed in a young man, aged twenty years.<sup>1</sup>

Cases of congenital ectopia of the lens, or of partial luxation, followed by astigmatism, have been observed.

Admitting the fact that the crystalline takes part in the production of astigmatism, it is evident that the lens is susceptible to change from age, under the modifications to which it is subjected. The static refracting force of the lens diminishing as the equalization of the index of refraction of its several layers occurs, its static astigmatism should diminish equally. But it is above all the dynamic astigmatism which varies with the diminution of the force of accommodation. Thus it is that the astigmatism of the eye becomes augmented with age in proportion as the crystalline becomes unfitted to correct it under the influence of the contraction of the ciliary muscle. In the case, on the contrary, where the astigmatism is produced by hyperspasm of the ciliary muscle; we see *it* diminish with the enfeeblement of the accommodation as age advances."

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The foregoing quotations would seem to convincingly show that there is such a state as astigmatism of curvature ( $A^c$ .) Indeed Landolt in his work cited, and in the first volume of the *Traité Complet D'Ophtalmologie*, by L. DeWecker et Landolt, 1880, introduces a chapter upon ametropia of curvature, after having considered axial ametropia. Just how this ametropia of curvature is induced, is still a question. My own convictions on this subject have been induced, to a certain extent, by measurements with my prisoptometer, which determines ametropia with a greater accuracy than do test types. Thus through its aid, if there is found before the use of duboisine, one dioptric of simple myopia, and on instilling that agent, the ametropia disappears, it is clear the defect was due to the action of the ciliary muscle, now paralyzed. Again, an ametropie de-

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1. Donders. loc. cit. p. 532, Eng. Ed.; p. 447, Germ. Ed.

velops = — D 1. sph.  $\ominus$  — D 0.5 cy. myopia, and, on thoroughly using duboisine, the spherical defect remains, but the astigmatism has vanished. Again, there is an astigmatic myopia = D 0.5 cy., and on paralyzing the ciliary muscle, this not only disappears, but there is developed a hypermetropic astigmatism = + D 0.5 cy. The latter may be due to the cornea, but the former would seem to be due to ciliary muscularity acting upon the lens in this case. In the correction of such a case as the last, better remote vision is often induced by the negative cylinder, and the proximal sight is better with a positive cylinder, and adults as well as children accept thus the one or the other positively.

The adaption of lenses in the correction of ametropia upon its *manifest* degree, without mydriatics, is certainly an important subject. Especially is it interesting, when we consider, that, perhaps the larger number of spectacles, adapted to eyes in this country, are applied by more or less skilful opticians; upon the *manifest* states of refraction and without the use of mydriatics. While perhaps generally such corrections are satisfactory to the patient, and, while not urging such a mode of procedure, the apparently favorable results merit attention. While depending upon nothing less than a knowledge of the *latent* as well as the *manifest* states of refraction, a fair trial of the correction based on the former, may prove unsatisfactory, and a resort to *that* indicated from the latter examination, will be successful in practice.

Keeping these conclusions in view, the question to be solved in a given case of simple myopic astigmatism of curvature, would seem to be, shall the myopic focus be thrown back upon the emmetropic retina, in one meridian, or shall the normal focus of the meridian at right angles to the *former* be brought forward on the same plane as that of the myopic focus.

Take a case of simple myopic astigmatism of curvature = — D 0.5 cy. The retina is found at 20 mm from the cornea. =  $F''$  =  $f''$ . The nodal point (emmetropic) is 15 mm from  $F''$  or  $\varphi''$ , or 5 mm behind the cornea which is = the radius of curvature of the cornea =  $r$ . The anterior focal distance is 15 mm in front of the cornea =  $\varphi'$ . The index of refraction of the eye is

$1.333 = \frac{4}{3} = n$ . These are the optical constants of Donders' reduced eye. Let the object be placed at  $D\ 0.5 = 2000$  mm. from the cornea = the punctum remotum =  $R = f'$ . As it is the length of the radius of curvature of the lens which varies the normal radius  $r$ , what will be the value of  $r$  in this example in the defective meridian.

Employ the formula given by Landolt, loc. cit. p. 133, or

$$r = \frac{f' f'' (n-1)}{f'' n + f''} \text{ Substituting}$$

$$r = \frac{2000 \cdot 20 \cdot (1.333-1) \cdot 333}{2000 \cdot 1.333 + 20} =$$

$$\frac{13320.000}{2686.000} = 4.959 \text{ mm. Hence,}$$

$F'' = f'' = \varphi''$  in this case = four times this radius or  $4 \times 4.959 = 19.836$  mm.  $F' = f' = \varphi'$  in this case = three times this radius or  $3 \times 4.959$  mm. =  $14.877$  mm. The foci are each shorter in one meridian as well as the radius in such an eye, and in the same plane the nodal point is advanced and its refraction increased. If this error of refraction be corrected by placing a — cylinder at  $\varphi' = 15$  mm. from the cornea; the glass being =  $-D\ 0.5 = 2000$  mm. less  $\varphi'$  or  $2000 - 15$  mm. =  $2985$  mm., or =  $-D\ 0.335$ ; then  $r$  will become  $5$  mm. and  $F''$   $20$  mm. The image upon the retina will

$$= \frac{K \varphi'' = G'' = \text{emmetropia} = 15 \text{ mm.}}{K \varphi'' = \varphi'' = \text{ametropia} = 15 \text{ mm.}} = \frac{1}{1} \text{ or } 1.$$

It follows that remote vision will be emmetropic in a normal eye.

How will the image be affected if  $+D\ 0.5$  cy. be applied axis at right angles to the former—cylinder? It should be recalled that this example is a myopia of curvature in one meridian with the opposite, at right angles to it, emmetropic. The application of this cylinder =  $+D\ 0.335$  at  $\varphi'$  will cause the  $F''$  to be advanced  $0.164$  mm in the given meridian, and now the—focus and *this* + corrected focus will be on the same plane, and both in front of the retina. If the ciliary muscle does not relax, distant vision cannot be distinct. If, however, the object be approached to the eye, the divergency due to proximity

will cast the foci of each meridian upon the retina, and proximal vision will be distinct. The foci of each meridian being 0.164 mm. in front of the retina, what distance must the object be approximated when the object R is at 2000 mm from the cornea = F'. The relation between the former quantity and the latter and the normal  $\varphi'' = 20$  mm. must give this. Hence, as  $20 : 0.164 :: 2000 : 16.4$  mm. = D 0.61 = approximation of object. This diminution of R or f' renders less accommodation necessary in near vision = D. 0.61. If the party desires to read at 3 dioptrics from the cornea, the accommodation required will be = D 3 — D 0.61 = D 2.39 or a saving of ciliary muscle force of over 20 per cent due to the approximation. By the application of the + cylinder = D 0.5 — 15 mm. at  $\varphi'$ , the nodal point has been restored to 5 mm. and hence the retinal images become =  $\frac{1}{5}$  or 1. Thus it is, in proximal vision, that the + cylinder gives comfort and equally as distinct vision as the negative cylinder does in the remote.

But it may be inquired what will be the effect of this approximation of the punctum proximum, upon the increased force exercised by the internal recti, or upon the *punctum convergens*, ( $P^c$ ). Suppose that at 20 centimeters = D 5.0, the ametropes can just overcome a prism of  $10^\circ$  placed before each eye, and that the base line or distance between the pupils for parallel rays = 64 mm. Nagel<sup>1</sup> gives the value of the "angle metrique" (A. M.) with such a base as  $1.833^\circ$  exactly  $1^\circ 5'$ . The angle of deviation in such a case would =  $\frac{10^\circ + 10^\circ}{4} = 5^\circ$  for one eye.

Divide this quantity by the value of the angle of convergence at

$$1 \text{ meter} = 1^\circ 50' = \frac{5^\circ}{1^\circ 50'} = 2.72. \quad \text{"Angle Metrique"}^* \text{ (a. m.)}$$

Add to this the D 5. of accommodation, or D 5. + 2.72 = 7.72 a. m. which represents the power of each internal rectus. But this ametropes desires to read at D 3. or 33 cm. Hence the a. m. at this distance would be represented by  $2.72 + D 3, = 5.72$  a. m. But it is found that this ametropes is compelled to use a greater force of the internal recti from the greater proximity of

1. ee Landolt loc. cit. p. 184.

the object to the eye. This power is = D 0. 61. Hence, 5.72 a. m. + D 0.61 = 6.33 a. m. There is therefore in this case a reserve force in each internal rectus =  $7.72 - 6.33 = 1.39$  a. m. Hence the approachment of the object to the eye does it no injury, and the object is seen clearly in near vision.



## OPHTHALMIC NOTES.

BY CHAS. J. LUNDY, A. M., M. D.

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CASE I.—*Glaucoma following the Sting of a Bee.*—On October 22, 1884, Mrs. Montier, æt. 50, came to consult me regarding her eye. She gave me the following brief history: Four weeks before, while watering flowers in her garden she was stung upon the eyeball by a humble (bumble) bee—the *bombus terrestris*. The sting was in the region of the insertion of the rectus externus of the left eye. The tissues at once became greatly congested and swollen, and very painful. The swelling extended to the lids and side of the head and face, and the former were so œdematous that it was almost impossible to open the eye for several days. The pain was continuous and soon became so severe that no sleep could be obtained for several days, although the attending physician gave anodynes freely. Sight failed rapidly, and at the end of a week she had scarcely perception of light.

Upon examination, I found the following conditions. Eyeball greatly congested, especially in the ciliary region, the cornea lusterless and almost devoid of sensibility, the anterior chamber extremely shallow, and iris in contact with the cornea at ciliary border, the aqueous humor cloudy, the pupil dilated and immobile; the iris discolored and muddy looking, the lens and vitreous humor hazy, tension +3, and no perception of light. On account of the hazy condition of the media no view of the fundus oculi could be obtained.

I advised enucleation, but the patient would neither consent to enucleation nor sclerotomy, which latter was proposed when enucleation was rejected. Eserine, gr. ij ad ʒj was ordered in-



stilled every hour. This slightly reduced the hardness of the globe and afforded some relief from pain. The improvement was transient, however, for while she slept without anodynes for the first time in four weeks, the relief from pain was of only four or five days' duration. At the end of a week the tension and pain were as great as at first consultation. Atropia was now tried but with no particular benefit. After a time she consented to let me perform a sclerotomy. The operation afforded some relief from pain, and the tension on the day following, was not above +2. The relief was temporary, however, and she soon began to suffer again, and in time pain became as severe as before. Being now nearly exhausted from her long continued sufferings, she submitted to enucleation. Assisted by Dr. A. B. Chapin, I enucleated the eye on Nov. 5th, '84, using cocaine as the anesthetic. On examination the eye presented the usual appearances of glaucomatous eyes. In regard to the use of eserine in such cases, I have often observed that it reduces the tension and mitigates the sufferings for a short time, but that increase of tension returns again after a certain period. This may be due to the fact that the ciliary muscle upon which it acts so powerfully soon undergoes atrophic changes in glaucomatous eyes, and that it is incapable of exercising the beneficial influence which it does in primary acute glaucoma, if used early.

CASE II.—*Epileptic Convulsion during a cataract operation.* Duncan G., æt. 32, consulted me May 16th, '85. He had a mature, soft cataract in right eye. The left eye was totally blind as the result of a severe inflammation five years before. On the 19th of May, assisted by Dr. Wean, I extracted the cataract at Harper Hospital. Cocaine was the anæsthetic employed, and of this two drops of a five per cent solution were instilled into the eye every two minutes for a quarter of an hour. Nothing peculiar was observed about the patient until I had completed my linear incision after the method of Von Græfe. I then observed that the patient was acting and breathing peculiarly, and the speculum was quickly withdrawn, and firm pressure made over the closed lids. Scarcely had the eye been closed when the patient uttered a peculiar cry, so familiarly known as the "epileptic cry," and at once his body was vio-

lently convulsed. After the lapse of some minutes he regained consciousness, the cyanosis of the head and face disappeared, and the effects of his fit were soon over. After the lapse of several minutes the operation was proceeded with, and terminated as successfully as if nothing had occurred. Not only was the lens entirely removed, but it was observed that the capsule was opaque, and it also was removed. Not a drop of vitreous was lost, and, except for the delay, everything was as smooth as in any operation.

Immediately after recovery from the epileptic attack it was observed that his pupil was dilated to a remarkable degree, and after the extraction of the lens and the opaque capsule, the assistants could plainly see the vessels of the retina with the unaided eye. Strange to say the pupil never contracted again during his stay in the hospital. The final result was not satisfactory for some inflammatory reaction followed the operation and the vitreous became cloudy and did not clear up. Whether the inflammation resulted from the effects of the operation and the convulsion, or from his subsequent bad behavior, I am unable to say. He removed his bandage more than a dozen times a day, and in other ways was entirely beyond control. Both he and his friends denied that he had ever had epilepsy before, and while he had no other attack while in the hospital, yet I think he was an epileptic, for his mental condition was not good. Other similar cases may have been reported, but if so I have not seen them, or do not now recall them. I am at a loss to know the cause of the attack. The patient was positive he had felt no pain from the operation, and as the cocaine was not used hypodermically, I do not think the fit could be ascribed either to pain or to the drug.

CASE III.—Wm. A., æt. 21, was brought to my office January 13, 1886, by Dr. Foster, of Reed City, Mich. About four weeks previous his left eye began to trouble him. There was slight pain, photophobia and lachrymation with inability to use the eyes for work, also some ciliary congestion; but these symptoms were not at all marked or severe. Two weeks later the left eye became involved, and presented much the same conditions. Iritis was suspected by his physician at the onset of the disease,

but as the pupil dilated under atropine the diagnosis was abandoned. On first consultation I learned the foregoing facts, and also that the patient had contracted syphilis about a year and a half before, and that he had been treated for the primary and secondary lesions by two reputable physicians. On examination I found conditions as above described with an almost immovable pupil, and with small posterior synechia. The small amount of plastic matter in the inflammatory exudate was shown by the fact that there was little tendency to the formation of firm synechia. In the course of a few hours the pupils dilated widely under the influence of atropia. In neither eye could there be observed any punctate condition of the cornea such as we observe in serous iritis, and yet the small amount of plastic matter thrown out upon the iris and the subsequent history of the case pointed in the direction of a serous iritis. At the time, however, I regarded this as a case of iritis due to constitutional syphilis, and my readers must judge of the correctness of this view. The patient had been for some time taking anti-syphilitic remedies and the continuance of these and the local use of atropine were advised and the patient returned to his home.

Early in February he returned again, saying that for a week past his eyes had been worse. On examination, I found numerous small points of infiltration in each cornea. The cloudiness produced was not at all marked, but they grew more dense day by day. The case now presented the appearances of interstitial or parenchymatous keratitis in its incipency, although the cornea were perfectly clear when he first consulted me. Upon closely questioning the patient, I learned that his parents were healthy, and that there was nothing in them to indicate a syphilitic taint. His family history was remarkably free from evidence of scrofulosis, and the young man's health had always been good, and he did not suffer seriously from the syphilis he contracted a year and a half before. His case progressed favorably, and in eleven weeks he returned to his home with right cornea still a little hazy, and left cornea quite clear. Vision in R. E. =  $\frac{20}{X}$ ; vision in left =  $\frac{20}{XV}$ .

The questions which present themselves in connection with

this case are: first, were his iritis and his keratitis due to one and the same cause? second, was that cause inherited syphilis? third, if it was not inherited syphilis, what was it? fourth, could he, having an inherited taint, acquire syphilis, as he undoubtedly did? for I have confidence in the medical gentlemen who treated him for primary and secondary lesions. [This seems to be one of the comparatively rare cases of kerato-iritis due to acquired syphilis. EDITOR].

REPORT OF THE OPHTHALMOLOGICAL PART OF  
THE SECTION OF OPHTHALMOLOGY,  
OTOLOGY AND LARYNGOLOGY.

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THIRTY-SEVENTH SESSION OF THE AMERICAN MEDICAL ASSO-  
CIATION HELD IN ST. LOUIS, MAY 4 TO 7, 1886.

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BY ADOLF ALT, M. D.

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TUESDAY, MAY 4.

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The first paper was read by Dr. Jackson, of Philadelphia, on Retinoscopy (shadow test) for the detection of ametropia. He recommends for this method an ophthalmoscope with a flat mirror of a diameter of one inch and a half. Ophthalmoscopes of English or French make are therefore more useful for this method of examination, than American ones. He thinks this method especially adapted for the detection of astigmatism and, furthermore, in the examination of unruly patients, and in nystagmus.

In the discussion of the subject of this paper the main point elicited was, that retinoscopy is especially adapted to quickly determine the existence or non-existence of astigmatism of high degrees, or of hypermetropia and myopia combined with astigmatism.

The discussion was participated in by Drs. Fryer, of Kansas City, Johnson and several others.

The second paper was read by Dr. Dibble, of St. Louis., introducing his perimeter, for which he did not exactly claim originality, yet he offered it as an improvement on Foerster's, which it resembles very materially, being, however, lighter and cheaper and having a registering plate.

The main features of this instrument are, that it has an iron stand, instead of a wooden basis; that it can be taken apart and

stored away in a box; that instead of a semi-circle, only a quadrant is being used, on which the object-bearer slides in the same manner as it does on Foerster's instrument. The author claimed that Foerster's instrument was too bulky and unhandy, and, furthermore, that the test of the visual field by the hands or the blackboard (Hirschberg) was unscientific.

After a recess for the inspection of the very neat instrument which costs only \$50 in a proper box, an animated discussion took place upon the merits of the instrument. It seemed to be considered by most of the gentlemen to have peculiar advantages, while others stated that they could hardly see them. It was said by Dr. Fox, of Philadelphia, to be almost exactly like McHardy's, of London, which latter was, however, better, since it had a good registering apparatus and a good face rest.

With regard to McHardy's instrument, Dr. Dibble stated that it ought to be called Stevens' instrument, since he knew that McHardy had stolen it from Stevens.

The discussion was participated in by Drs. Thompson of Indianapolis, Coomes of Louisville, Reynolds of Louisville, Hazen of Iowa, Alt of St. Louis, Webster Fox of Philadelphia.

#### WEDNESDAY, MAY 5.

On motion of Dr. Savage, Dr. Chisholm was then requested to make some remarks on iridectomy. He stated that he had got a statement from Dr. Michel, of this city, which had startled him, namely, that he did no longer bandage nor confine patients after iridectomy or extraction had been performed, and that his results were better than before. No statistics were brought on to prove the statements. The discussion brought about some rather severe criticisms on such action, and it seemed to be the feeling of the majority that to let well enough alone was wiser, until it could actually be proven, that something was really to be gained by such a procedure. Dr. Chisholm stated that he for one was going to test, whether the artificial photophobia, which is undoubtedly caused by the bandaging, could not be dispensed with without causing other disagreeable results by not bandaging such eyes.

Dr. Thompson, of Kansas City, reported a case of exophthalmus with no appreciable cause, although the orbit was under ether examined with probe and syringe.

Dr. Alt then showed to the section Dr. H. Culbertson's Prisoptometer for the detection of ametropia of all kinds.

In this instrument, as the name implies the refraction of two prisms placed together with their apices is made use of to detect the refractive condition of the eyes to be examined. In looking at a white circle at a given distance through the prisoptometer two circles will be seen which for the emmetropic eye are tangent. A myopic eye will see them overlapping, and a hypermetropic eye will see them apart. The glass which brings the circles into the first (tangent) position for the examined eye is the correcting glass for the ametropia of that eye. By means of this instrument astigmatism may also be determined, as by turning the prisms around the axis, the circles will be seen to travel around each other. If in any meridian there is hypermetropia or myopia, the circles will be apart or lap over in this meridian, and the correcting cylindrical glass can easily be found.

Dr. Alt stated that the few trials he had been able to give the instrument had convinced him of its usefulness, especially with children, and he thought he could recommend it. He further added that the instrument could be bought for \$21 without and for \$25 with stand of the Geneva Optical Company, Geneva, New York.

Next came a paper by Dr. Alt on some points in the management of trachoma. After reviewing the histology of the normal conjunctiva and detailing the histology of the trachomatous conjunctiva, the author stated, that the rules for the treatment should be either to bring about absorption of the trachomatous cell aggregations (follicles), or their evacuation. The former is accomplished by the stimulating treatment with sulphate of copper, yellow or red oxide of mercury, and other similarly acting chemicals. The second intention may be accomplished by different operative procedures, (puncture, excision, etc.,) and by the inoculation with the jequirity-poison. For the later stages of the affection iodol was recommended.



The paper was very amply and instructively discussed by most of those present.

The last paper was read by the president of the section, Dr. Eugene Smith, of Detroit. It referred to the successful transplantation of rabbit's conjunctiva into the conjunctival sac of a patient for the cure of symblepharon.

The discussion was cut short by the lateness of the hour.

Many of the members then examined and discussed the prism-optometer of Dr. Culbertson.

#### THURSDAY, MAY 6TH.

Dr. Murrell, of Little Rock, reported an interesting case of foreign body in the eye-ball. The discussion, which was very animated, and drifted into the subject of sympathetic ophthalmia and evisceration as a substitute for enucleation. Finally Dr. Frothingham, of Ann Arbor, moved something as follows: "That this section give it as their opinion that evisceration is an unsafe operation as regards sympathetic ophthalmia, and is not to be substituted for the latter." Drs. Alt, Thompson, Jackson, Hazen and several others protested against the adoption of such a motion, although they all agreed with its sentiments. It was then laid on the table for one year.

Dr. Dickinson, of St. Louis, reported an interesting case of pemphigus of the eye.

Dr. Frothingham thereupon read a paper in which he showed that in his experience the instillation of cocaine had never caused any bad effects, and that he considered it the best anaesthetic in ophthalmic surgery.

Although several of those present had seen disagreeable general symptoms to follow the instillation of cocaine into the eyes and believed in a peculiar idiosyncrasy in some individuals, the author's ideas were concurred in by most of the members.



TRANSLATION.

THE JEQUIRITY POWDER.

(From the *Revue clinique d'oculistique*, March, 1886.)

BY DR. DUJARDIN, (LILLE).

The question of the use of jequirity, now almost three years old, is not yet solved. He would be sorely puzzled who, without any experience of his own, should try to form an opinion concerning the value of this drug from so many contradictory statements which he may find at every step in the abundant literature of this subject.

For the ones jequirity is a most dangerous remedy, the use of which ought not only to be abrogated, but even prohibited on account of the disasters which follow its therapeutic application. Vossius, (of Koenigsberg) absolutely condemns jequirity after a series of grave results. \* \* \*

\* \* \* It would be best to quickly forget jequirity if all experiments with it had led to as unhappy results as have those of the German surgeon. This not being the case, we will go to the partisans of jequirity, and here we find enthusiasts, especially Copper (of Brussels.) \* \* \*

\* \* \* We have ourselves very largely experimented with jequirity since the first few days after its introduction into the therapeutics of ocular affections. We had excellent opportunities in our department of the North, which is so full of people suffering from trachoma. In the *Journal des Sciences Médicales* of Lille, (June, 1883) we have related our first experiences which were undoubtedly happy ones, yet we did not allow ourselves to be carried to the unbounded enthusiasm of De Wecker who saw as certain a specific in jequirity against granular ophthalmia, as in quinine against malarial infection.

1 See this Journal, Vol. II, No. 9, page 208.

We had found that the jequirity ophthalmia had an especial and powerful action in clearing up the pannus. Its effects on the granules in the conjunctiva in a great many cases appeared to us as almost *nil* \* \* \*

\* \* \* We said, therefore, in a general way that we were tempted to believe that jequirity acted well upon the granular keratitis and very little upon the granular conjunctivitis, especially where there was a certain degree of hypertrophy of the granulations (!) \* \* \*

After a three years' experience we are not only not forced to renounce the conclusions drawn in our first paper, but on the contrary we must uphold them perfectly. Especially in the cases of old trachoma, when the granulations of the conjunctiva have begun to become atrophic, and where there is a discouraging corneal trouble, it is well to have recourse to jequirity as a heroic remedy. \* \* \*

\* \* \* But it is not necessary to reserve jequirity for these cases only. When there are combined with the pannus of the cornea, projecting granules in the conjunctiva, the jequirity may also be applied with great advantage; it will give back to the cornea a part of its transparency, but it will leave the granules about in the same state as they were before. The common caustics the sulphate of copper, the nitrate of silver, the hydrochlorate of mercury, will finish the work so happily begun with the aid of the jequirity, and by this mixed treatment the healing, otherwise so prolonged, will be materially shortened. This result is also a valuable one.

After having used at first the weak macerations of jequirity recommended by De Wecker, we have dared to use more concentrated preparations, five or six per cent, without, however, reaching ten per cent. as Coppez advised. \* \* \*

\* \* \* A serious objection to macerations of jequirity is their rapid disintegration in spite of all precautions, as the addition of boracic acid, salicylic acid, creosote, etc. \* \* \*

\* \* \* We have never seen any accident due to the use of this remedy, although we have treated more than one hundred cases with strong macerations of jequirity of six and even seven per cent. The success remained often behind our hopes,

but never have the eyes which were treated with jequirity suffered any damage from this agent.

It was, therefore, not this consideration which prompted us to use the jequirity powder, but the annoyance caused by having to prepare a fresh maceration for almost every patient, in order to get a good effect.

Instead of applying the powder directly to the conjunctiva, we prefer to dust it onto the inner surface of the lids with a camel's hair brush. The eye is then allowed to rest for a few minutes. The mechanical action of the powder causes some redness and lachrymation, but no pain worth mentioning. We usually apply it a second time, and even a third time, when we think it necessary to cause a violent inflammation. Before sending the patient to his home, we take the precaution to wipe all powder collected in the lower conjunctival fornix away with the finger, as a jequiritic eschara in this location might cause the formation of a symblepharon and even of a certain degree of entropium of the lower lid.

About thirty patients have been thus treated and all except the first few, have not been kept in the infirmary, but have been sent home with a simple treatment with sulphate of copper or nitrate of silver. The lack of sufficient space forced us to act in this way. Their stay in the hospital would of course, be preferable. \* \* \*

\* \* \* We have to state here, that the jequirity powder, dusted twice or three times into the eyes, as described above, within a quarter of an hour, develops a jequiritic inflammation, which is at least equal in intensity and in duration to the one resulting from the use of a five per cent maceration. In this we differ from A. Alt's opinion, and this difference is undoubtedly due to the fact, that we use the powder much more freely than he does, since he makes only one application and that even limited to one or the other lid. With these reservations we agree with the American surgeon in proclaiming the superiority of this new method of the application of jequirity. It seems to us that the powder is called upon to take the place of the macerations which have until now almost exclusively been used by those who had confidence in jequiritism.

### CORRECTION.

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Dr. Dudley S. Reynolds asks us to have the following correction made in his article "The prolate lens of Dr. Fox" April 1886, page 95:

14th line from below read

+ 11 *D* 60° + 12 *D* 35° + 15 *D* 150°

instead of + 11 *D* 60° + 15 *D* 35° + 16 *D* 150°

## THE RATIONAL METHOD OF TREATING CATARACT PATIENTS TO THE EXCLUSION OF COMPRESSES, BANDAGES AND DARK ROOMS.

BY JULIAN J. CHISOLM, M. D., OF BALTIMORE, MD.

J. W., æt. 71, had cataract fully formed in left eye and forming in right. He was healthy, had good light perception in the cataractous eye, and was anxious to have sight restored.

The left lens was removed under the anaesthetic influence of a four per cent solution of the muriate of cocaine. Graefe's linear section with iridectomy upwards. After lens extraction patient counted fingers readily. The eye was washed with a biniodide of mercury solution one part to twenty thousand of water, then a few drops of a one per cent solution of atropia were applied and the eyes closed. Instead of the cloths, compresses and retaining bandages, the lid of each eye was kept closed by a piece of isin-glass plaster  $2\frac{1}{2}$  inches long by  $1\frac{1}{2}$  inches wide. The piece of plaster made thoroughly pliant by being soaked in water, was spread over the lids from brow to cheek and carefully adjusted by stroking it with the rubber spoon, used for pressing out the lens. In a very few minutes this piece of diaphanous silk plaster was dry, and the patient was ready to walk from the operating table to his bed in the fourth story of the hospital. He was treated in the open ward and not in a dark room, on the reasonable belief that as the patient stood strong light before the cataract was removed, the closed lids, the substitute for the cataractous screen, ought to be a sufficient protection now. The room had blue curtains to exclude harsh light and for the comfort of other ward inmates. When in bed, the patient was told to seek the most comfortable position, lying on his back or on either side at his pleasure. He could get up for calls of nature, and sit up at meals, the only restriction being to keep his hands from the eyes and from the adhesive straps.

2d. day.—Patient reports a comfortable night. He has had

no pain. The adhesive straps are smooth and hold on firmly. No treatment necessary.

3d. day.—Patient continues to improve; one eye feels as well as the other; he has had no discomfort of any kind. No treatment.

4th. day. Patient has been sitting up, feels well, straps holding nicely. No new adjustment necessary. A drop of a one per cent solution of atropia was put at the inner canthus. It found its way under the strap, along the border of the outspread lashes and into the eye. Not enough was put to displace the plaster, and what remained outside of the lid, was soon evaporated; no other treatment.

5th. day.—The patient has had no discomfort of any kind. He sleeps well and eats heartily. The adhesive straps are still smoothly adherent. If there had been any lachrymation, it had evaporated from the surface of the adhesive plaster as fast as it had exuded from the eye, and had, therefore, left no trace of its presence. As the patient has had no trouble whatever, during the past five days from the time of operation, the presumption was that the corneal wound had healed and that the lid support was no longer needed. The straps were removed from both eyes today. The eyes opened promptly, bearing the moderate light of the room without watering. A few drops of the four per cent solution of atropia were instilled into the eye and the patient left without protection. No smoked glasses.

6th. day. Patient was found walking about the ward, having had no inconvenience whatever from the exposure. The eye operated upon had some slight injection, but not enough to induce either photophobia or lachrymation. It seems as far advanced in convalescence, as the most successful cataract extractions, treated by compresses, bandages and dark rooms, three weeks after operation.

8th. day. Found the patient sitting at the window with curtain raised, cleaning his nails with his penknife. He could look out into the sunny street without any inconvenience, and is really ready for discharge from the hospital, but will be kept a few days longer for inspection only.

Since the 11th day of May, sixteen cataract extractions have

been performed at the Presbyterian Eye and Ear Charity Hospital, on patients in public wards and in private rooms. With all of these, the new method was adopted. The sole dressings to the eyes were pieces of diaphanous isinglass silk plaster, large enough to extend from brow to cheek, and from one canthus to the other. These pieces were soaked in water and then thoroughly adjusted to the lid surfaces. This one dressing usually suffices for the entire treatment. If the straps become detached at the edges, as they did in some instances, they were replaced by fresh ones.

These patients were all operated upon in the operating room on the second floor of the hospital, and all under the anaesthetic influence of cocaine.

They walked to their rooms immediately after the operation, ascending to the third and fourth stories.

When put to bed, the only instruction to them was to leave the eye undisturbed.

No restrictions were put on their movements, nor as to diet.

One patient was found walking about on the second day. Several got out of bed on the third.

At no time were the rooms so dark that reading by others could not be enjoyed.

No water dressings were used.

The straps were finally removed on the 5th, or 6th. day.

All the patients bore the ordinary room light without photophobia or lachrymation, and without the protection of smoked glasses.

By the 7th. or 8th. days, patients were able to move about the house with eyes unprotected and with a degree of comfort unknown during the previous eight years existence of the hospital, and to the 582 patients from whom cataracts have been extracted up to the 11th. of May, 1886.

The revolution in the after treatment of cataract and iridectomy patients in this hospital is complete. From this time hence, all bandages, compresses and dark rooms will be among the things of the past, to be remembered only by the discomforts which they occasioned.

From my month's experience I am forced to the conviction



that the hyperaemia, photophobia, lachrymation and painful weakness of eyes after cataract extraction, are largely, if not altogether, due to the methods of eye dressing in universal use, and are, therefore, induced by the treatment and not by the disease.

A patient applies for treatment with matured cataracts. He stands light perfectly well up to the moment of operation. While lying on the operating table, with cataract extracted, with pupil doubly enlarged by the iridectomy and with the strongest light in the face, he suffers no inconvenience and makes no complaint of its harshness. When the lids are closed, the amount of light straying through them into the eyes is about the same as that to which he was accustomed before the cataract was extracted. Which is the more reasonable mode of treatment, leave him in this natural condition, or at once plunge him into utter darkness by covering the eyes with bandages and compresses, and by putting him in a room so dark that even his attendants can not see to get about. When he emerges from this confinement at the end of eight or ten days, by the removal of the bandages, is it surprising that the eyes should weep, and that light should be painfully offensive? Try your good eyes without operation with the bandages, and see if they will not behave in a similar manner.

Then again as to bandaging. We do it, believing that the incised corneal wound requires support, which it undoubtedly does; but do we fulfil the indications by the methods we adopt? Heretofore I have thought so when I applied over each eye a square piece of soft wetted cloth, then a ball of raw elastic cotton which the supporting bandages would press equally on all parts of the wounded eyeball. Grant that this was all secured and that the proper support was obtained, when the patient leaves the operating room, what is the condition when he gets into bed? His movements upon the pillow draw necessarily, the bandage unequally toward the side pressed by the head. No bandage, however elastic and however nicely adjusted, can keep up at all times in the varied positions of the head, equable pressure on any one surface. Admit this, then we must acknowledge that there are times when the eye may be irregularly com-



pressed, and that even before the lips of the corneal wound become adherent. Possibly this irregularity may even displace them after union has started, and therefore, might be positively detrimental.

Now, let us look at the new method of support, using natural means only. For how many years has the tarsal cartilage of the upper lid, thoroughly moulded to the rotundity of the eye ball, been its constant support. Let us make use of this eye splint which nature has especially prepared with its bandage all complete, in an orbicular palpebral muscle, which knows just how much tonic contraction is necessary to keep any part of the eye surface uniformly compressed. If a piece of isinglass plaster, having itself no perceptible weight, is made uniformly adherent to the surface of the lids, from brow to cheek, keeping the free edges of the lids in juxtaposition and ensuring a continuous muscular tonicity, then have we in reality found a perfect eye dressing for cataract patients. This dressing does not trammel any other part of the body than the part operated upon, and no movement of the patient can possibly disturb it. With this simple dressing the patient rolls about in bed at his pleasure without fear of injury to the eye.

The comfort to the patient is immense. The comfort to the attendant incalculable. There is no longer the dreaded darkness to the patient, nor the gloomy room to the attendant. We hear of no more stumbling over furniture nor complaints from friends that their eyes have been made weak by the confinement. Then when the straps are removed and the eyes are opened, the surgeon sees for himself the good strong eye, instead of hearing from the darkness the complaint of the patient, that tears are streaming down his face from the little light which his over-bandaged eyes cannot now stand. From this point convalescence is rapid. In a very few days patients are ready for dismissal, and that without having used any protection spectacles. Still advise patients on leaving the hospital to use smoked glasses for the sunny streets. I have already had some to discard this advice as unnecessary. Two patients came for inspection to my office, four days after their dismissal from hospital, and two weeks after the cataract extraction operation, walking through the bright streets without any protection whatever.

Of the sixteen cases of cataract extraction treated by this new method, three of whom being very recently operated on are still with closed eyes under the adhesive straps. I have had the most gratifying results. Most of them have been brilliant illustrations of the efficacy of this simple treatment. In no case have I had the weeping eyes of a former experience, all of them standing the light well the day the adhesive strap was removed. It is a revolution complete in eye dressings, and experience has proved it to be a wise and very beneficial change, which must meet with universal acceptance, even if it does break up one of our long and most confirmed habits.

With cocaine as the local anaesthetic, and adhesive straps as the eye dressing, with light rooms in which friends can read for the entertainment of those operated upon, cataract patients will in the future have little to dread from pain or confinement.

## ENUCLEATION IN PANOPHTHALMITIS, WITH A FATAL CASE

BY C. M. HOBBY, M. D., IOWA CITY, IA.

Undue reverence for the teaching of the great clinicians of the past, is not the most striking characteristic of American surgeons, yet at the last session of the American Medical Association, the suggestion that it was entirely safe to dispense with the traditional dark room after cataract operation, received but little favor, while there seemed to be an approach toward unity in the belief that enucleation in panophthalmitis was entirely safe, notwithstanding the hitherto generally accepted doctrine, that the danger to life under such conditions was much greater, than in enucleation under ordinary circumstances. It seems to the writer that the confinement of patients after operation, in dark, and necessarily unwholesome apartments, has no scientific explanation, while the anatomical relations of the diseased organ and the pathological process, in panophthalmitis, combine with the ripe experience of Von Graefe, and the occasional experience of many others, to teach that enucleation of the panophthalmitic eye, is accompanied with such an amount of risk to life, as to make the operation warrantable only, where the opportunity for gain is commensurate with the risk.

As this subject will doubtless be fully discussed at the next meeting of the American Medical Association, I will present, without comment, the notes of a case in point, kindly furnished by my friend, Dr. A. E. Rockey.

March 5th, 1886, P. B., age 45, German, stone mason. The patient's right eye had received an injury from a fragment of stone, in the spring of 1883, and had been troublesome since. During examination, while separating the swollen lids, the nuclear portion of the lens escaped, the condition was markedly one of panophthalmitis.

April 1st. Enucleation.

April 2d. Has felt well since the operation, no pain, appetite normal. 10 A. M., slight chill followed rapidly by thirst, fever nausea, vomiting and delirium. 1 P. M. Pulse, 145, temperature 103°.

April 3d. Delirium continued through the night and day, and during the evening of this day, he became comatose.

April 4th. Comatose. Death at 6 P. M.

## EIGHT ENUCLEATIONS OF PANOPHTHALMITIC EYE-BALLS. NO ANTISEPSIS. NO MENINGITIS.

BY ADOLF ALT, M. D.

The foregoing paper by Dr. Hobby in connection with a number of papers on the subject of meningitis and death following the enucleation of eyes while suffering from purulent panophthalmitis, prompted me to look through my notes and to collect the cases of panophthalmitis in which I had enucleated such eye-balls. The number would probably have been a larger one, had I kept a record of all the enucleations I performed in various charitable institutions. Those here presented are from my private practice and reference is only made to cases in which I made the microscopical diagnosis of purulent panophthalmitis.

I have not employed any antiseptic agents in these cases, except plenty of water. After the operation, when all bleeding had stopped, I bandaged the eyes with absorbent cotton and a flannel bandage, exerting some pressure on the tissues of the orbit. This bandage was invariably left *in situ* for twenty-four hours, then changed once every twenty-four hours for three or four days. After that no further protection was employed.

CASE I. G. B. C., æt. 29. The left eye had been injured four years previously, while he was at sea. What the injuring foreign body was, could not be made out exactly. He called it a "spark". Ever since he has been subject to intermittent inflammations, one attack of which, however, seems to have been gonorrhœal in character. During this latter attack sight was lost. A few days before consulting me, he had suddenly felt a severe pain in this eye, while sitting in the theater, and pain and inflammation had continuously grown worse since, and the fellow-eye began to show signs of sympathetic irritation (which later on developed into sympathetic iritis).

The left, blind, eye, when I saw him, showed chemosis, lachrymation, old scars of the cornea in which a new ulcerative pro-

cess was going on. The anterior chamber was filled with pus, and no details of the interior of the eye could be detected. Tension was normal, the eyeball painful to the touch.

I performed enucleation the day after this examination. No untoward symptom followed the operation, and the healing was undisturbed.

The histological examination proved this to be a case of purulent panophthalmitis, the whole uveal tract, the retina and optic papilla being affected.

CASE II. J. A., 27 years of age. While chiselling iron, patient was struck by a foreign body in the right eye three days previously. The eye had at once become very badly inflamed and painful. There was a suppurating wound in the corneo-scleral region, inwards, covered by the chemotic conjuction. The lower half of the anterior chamber was filled with fibrinous pus, the iris was greenish and swollen, the pupil drawn towards the wound, the lens grayish. No reflex could be obtained from the fundus oculi.

I performed enucleation at once. The healing was perfectly gentle and undisturbed, although the wound reopened during the operation, and some of the pus was evacuated.

The histological examination showed a well developed purulent panophthalmitis due to a small piece of iron embedded partly in the vitreous body and partly in the retina and choroidea near the macula lutea.

CASE III. Mrs. T. H., 25 years old. Patient had lost the right eye some years previously by a blennorrhœal conjunctivitis, probably of gonorrhœal origin. The blind and disfigured eye had given her no discomfort until within the last week, when it got suddenly and without any known cause very badly inflamed, and painful.

When I saw her there was considerable swelling of the lids and chemosis. The eyeball, which was staphylomatous, showed a whitish-yellow cornea with a central ulcer through which a calcareous lens was falling forwards. No further details could be made out.

The following day patient decided to get rid of the annoyance this eye gave her, and I performed the enucleation the same day.

Nothing remarkable followed the operation, and the healing was perfectly normal.

Purulent panophthalmitis of a high degree was found on histological examination.

CASE IV. H. Z., æt. 42. Patient had cataract in the right eye and pterygium on both eyes. While stooping down four days previously he had struck the right eye on a sharp bed-post and fallen down unconscious. When he awoke, the eye was soft, totally blind and painful, the lids began to swell and a severe inflammation gradually developed.

When I saw the patient, the lids were very much swollen, and there was a great deal of chemosis. There was a rent in the cornea extending on both sides into the sclerotic and through the ciliary body, with prolapse of the iris and the ciliary body. No ant. chamber. The eye was very painful. I snipped off the prolapsed portions of the uveal tract and ordered ice-applications etc. Yet, the inflammatory process did not seem to be in the least influenced by the treatment, on the twelfth day I enucleated the eyeball.

The histological examination showed the eye to be in a very active state of purulent panophthalmitis.

The healing was short and undisturbed.

CASE V. Mrs. M. S., æt. 64. Patient was treated at the Female Hospital for some specific affection, when the left eye, which had been blinded by ulcerations due to trachoma became very badly inflamed and painful.

When I saw the patient, there was œdema of the lids, chemosis, ulcerative perforation of the cornea (which latter was leucomatous but now appeared yellowish). The pain was excruciating, and nothing seemed to be able to allay it. After having observed the case for a short period, I decided to enucleate the eyeball.

On histological examination it presented a uveal tract in a high state of purulent infiltration; the vitreous body also was one mass of pus.

No untoward symptoms followed the operation.

CASE VI. J. R., 8 years old. Three weeks before I was consulted, the patient's right eye had been struck by the end of



a piece of steel-wire which when cut, had rebounded with considerable force. Great pain and swelling of the lids had followed three days after the injury. This had been declared to be erysipelas and been treated accordingly. When I saw the patient there was immense swelling of the lids, chemosis and exophthalmus. The cornea was partially necrotic. The anterior chamber was filled with pus. In the inner upper ciliary region the sclerotic showed a round opening, as if punched through, which was filled with pus. No perception of light. Severe pain and head-ache.

Being afraid to enucleate at this stage, I kept the patient under close observation for six days, during which period the eye was kept continually cool with iced compresses. As soon as the most active stage of the purulent inflammation was over, I enucleated the eyeball. The enucleation was very difficult, since Tenon's capsule was perfectly obliterated by tough connective tissue. The healing was absolutely normal. The histological examination proved the case to be one of purulent panophthalmitis.

CASE VII.—A. M., 53 years of age. Patient consulted me on account of attacks of pain in the left eye. This eye had been injured in his trade (stone cutting), and had become blind several years previously. There was no scar visible on the eye-ball, but in the anterior chamber lay the dislocated, shrunken and cataractous lens. The eye was considerably irritated, painful to the touch and spontaneously.  $V = 0. + T 1.$

The next day I tried to remove the crystalline lens from the anterior chamber, but as soon as the patient came under the influence of chloroform, the lens disappeared in the vitreous body.

The day after, the lens was again in the anterior chamber and caused a renewed attack of pain. This time I tried to remove the lens from the eye, without an anæsthetic, and while the patient sat upright. After having made the counter-puncture, I allowed the aqueous humor to escape. Everything had gone well, when, just as I had completed my section, the patient squeezed the lids together in such a way that the speculum and a large quantity of vitreous body shot out of the eye. The lens



fell back into the vitreous body, and the repeated attempts to reduce or snip off the prolapsed iris were frustrated by the totally unmanageable patient.

A purulent panophthalmitis resulted from this operative traumatism, and on the ninth day after it I was forced to enucleate the enormously painful eyeball.

The healing was quick and normal.

CASE VIII.—A. W. C., æt. 52, farmer. Patient's left eye had years previously been injured by a thorn, and had been almost blind. Three weeks previous to my seeing him he had taken cold in that eye and had since suffered excruciating pain with it, which was not relieved when the eye burst. When I saw him the cornea was almost all over superficially necrosed, a perforation in the lower outer quadrant was plugged by iris tissue. The anterior chamber was filled with pus. V. =  $\frac{1}{x}$ .

—T. 1. There was some chemosis.

I performed enucleation the same afternoon under chloroform, although the patient was consumptive, and had a large cavern in the left lung. During the operation the eyeball burst, and a large quantity of pus was discharged.

No untoward symptoms followed the operation. The histological condition, as in the former cases, proved it to be a case of purulent panophthalmitis.

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As it has long been stated that enucleation of a panophthalmitic eye-ball is dangerous to life, and as, of late, the number of cases in which meningitis, either fatal or nearly so, followed the operation, seems to have become rather frequent, I think, in order to come at the real truth, the experience of such enucleations which were not followed by any untoward symptom should also be reported. The old dogma that purulent panophthalmitis of one never led to any sympathetic affection of the fellow eye has, in the light of more recent researches, to be abandoned. Although I have in the foregoing only given cases from my own private practice, I know of a good many more cases from the practice of others since I had occasion to histologically examine the enucleated eyes. The possibility of danger in these

cases cannot, of course, be denied, but it seems to me that this danger is at present being considerably overrated. It even seems to me that the danger of infection of the meninges and brain would be decidedly increased by allowing an eyeball filled with pus to remain in the orbit, and its lymphatics in continuity with those of the cranial cavity.

## FOUR CASES OF GALEZOWSKI'S METHOD OF CATARACT EXTRACTION, THE LAST SLIGHTLY MODIFIED

BY H. CULBERTSON, M. D.,

ASSISTANT SURGEON U. S. ARMY, RETIRED.

In January, 1883, in his journal, *Recueil D'Ophthalmologie*, p. 67, M. Galezowski announced his method of cataract extraction. At that date he had done sixty-four operations "without having to deplore any serious accident," and he states that he had from one-fourth to one-third better vision, than from Von Graefe's linear extraction.

In the same journal, 1885, p. 91, he reports as follows: that from a total of 486 cases of his extraction, without iridectomy, and performed at his public and private clinic, there were

437	cases completely successful,
37	" of iritis with obstruction of pupil,
13	" " phlegmons of the eye,

—  
487 " total.

It will be noticed that there is an error in these results of one case excess, which can only be corrected by M. Galezowski.

He adds that there were

53	secondary cataracts requiring discission.
10	cases of prolapse of vitreous.
25	hernias of the iris.

—  
88 cases, total.

Thus, the completely successful cases equal 89.8 per cent, and the phlegmons of the eye (supposed to be lost) amounted to 2.6 per cent. It is not stated how many of the complicated cases gained useful vision. Probably many did. In most of the cases of iritis, there were syphilitic antecedents present. Eight of the

hernias of the iris were caused by the imprudence of the patient, and in one, the cause was due to an attack of epilepsy, and another was caused by delirium tremens.

In five cases of the phlegmon class, the cause was wounds or traumatisms from imprudence. In five the patients were glycosuric. Five cases of suppuration of the flap occurred, which was arrested in each by carbolic spray cast upon eye ball and wound.

His operation is performed as follows:

1st. The eyelids are separated with a speculum, and the eye-ball is secured below the cornea by fixation forceps and the eye rolled downwards.

2nd. With a fine pointed narrow Von Graefe knife, puncture is made at the corneo-sclerotic junction 3 mm. above the horizontal diameter of the cornea.

3rd. The point of the knife is passed to the lower border of the previously dilated pupil, and the capsule is divided with it from below upwards to the upper limits of the pupil by depression of the handle of the instrument, the point describing the arc of a circle, the blade of the knife is not turned on its axis; then the counter-puncture is made opposite the point of puncture: (when this method was first proposed, the capsule was also incised horizontally before counter-puncturing).

4th. The incision is carried upwards and slightly forwards and completed wholly within the cornea, at two millimetres from the upper corneal margin.

5th. The speculum and forceps are withdrawn.

6th. The upper eyelid is elevated with the right little finger, and at the same time pressure is made upon the upper border of the sclerotic above the apex of the incision with the curette with the same hand.

7th. With the thumb of the left hand pressure is made, through the lower lid, upon the inferior border of the cornea. The lens escapes without difficulty.

8th. If the iris is within the wound, it is replaced with a silver stylet.

9th. Eserine is instilled.

10th. Weak carbolic solution is sprayed upon the eye ball for

two minutes, and the eye is bandaged and carbolized dressings applied.

He lays great stress upon these carbolized dressings. In the *Recueil d'Ophthalmologie*, 1885, p. 577, he refers to the fact that he has caused to be made thin gelatine wafers impregnated with cocaine and mercuric bichloride, the former of which, I believe, he employs during the extraction. This wafer is placed over the corneal wound and cornea and front of eye ball beneath the eyelids, after the carbolic spraying. It remains, is slowly dissolved, and serves to keep the wound in apposition, and assists in closing the anterior chamber by its adhesion to surrounding parts, and also serves to constantly soothe and disinfect the eye.

He never excises the iris except for the following reasons: when it falls in front of the knife and is cut; in traumatic cataracts with synechia posterior; in case it covers the lens, like a cap, preventing its escape; and when it has been ruptured by the hard or voluminous lens.

He has done several extractions successfully by this plan, when there was present chronic inflammation of the lachrymal passages. I have imported some of these wafers, but decided not to use them, fearing changes might have taken place in the cocaine in them, which would retard the healing of the corneal wound or induce inflammation, and believing that *fresh solutions only* should be used of cocaine.

The following are some of the cases in which Galezowski's method has been employed, the last of which has been modified somewhat from the plan of that operation.

CASE I. Mrs. N. D., aged 73 years, feeble but without visible disease, has double nuclear cataracts, the right mature. August 21st, 1883, I did Galezowski's operation on the right eye, without anaesthetic, (no cocaine known then), after freely dilating the pupil with hyoscine and duboisine, incising the capsule vertically and horizontally. The cataract came out easily, the incision adapted well and there was no enclavement of the iris. She had no unpleasant symptoms, but the wound healed slowly owing to her age and feebleness. Finally there was a slight synechia posterior to anterior capsule at the upper and inner

region, but the pupil was nearly round and the capsule open at its center. She went home September 17th, and with proper glasses V. prox. =  $D. \frac{1.75}{0.20}$ , and V. Rem. =  $D. \frac{12.0}{0.75}$ . Snellen. Her vision since, has much improved, as I learned last January, by letter.

**CASE II.** Mrs. Mary V., aged, 52, has lenticular cataract of right eye of traumatic origin. May 19th, 1885, I did Galezowski's operation under cocaine, after dilating the pupil. The vertical incision of the capsule only was made. No pain was felt. The lens cortex was pasty, and some of this remained. Duboisine was used after the operation. May 29th, there is slight enclavement of the iris in the corneal wound in its upper and outer region, and the pupil is oval, from outwards above and obliquely downwards and inwards. The capsule is open. She went home on this day.

June 11th she returned. I opened the original wound, under cocaine, at its outer part, drew out the enclaved iris, cut it off with scissors, and got a rounded pupil. As the posterior capsule was clouded, I passed a fine iris hook through the corneal incision and obtained with it a central opening in the posterior capsule, revolving the instrument on its axis. Ice, anodynes, and full doses of antipyrine relieved the subsequent pain and fever so that on June 16th she was up, about and comfortable, and the following day she returned home.

July 23rd she came again. Her eye was well and pupil and capsule clear. With + D 12.0 s  $\bigcirc$  — D 1.25 cy. axis 90° Right V. Rem. =  $D. \frac{4.0}{1.25}$ : and with + D 15.0 s  $\bigcirc$  — D 1.25 cy. axis 90° V. Right. Prox. =  $D. \frac{0.8}{0.33}$  Snellen. I have learned lately that her vision is still good.

**CASE III.** Miss. S. J. L., æt. 40. Has mature lenticular cataract of right, (from a cow's horn hooking under superior orbital process) and immature cataract of left eye, the latter from striking her left brow against an object. Is subject to attacks of sub-acute rheumatism.

January 28th, 1885. Operated by Galezowski's method, modified, on right eye. Entered knife at corneal margin 3 mm. above horizontal diameter; after puncturing cut capsule vertically and

horizontally with the point of knife; counter-punctured opposite to puncture-point; cut up in the sclero-corneal margin and completed the section in that junction and not at 2 mm. from it. For some reason, not stated in my notes, I did an upper iridectomy. The lens was then delivered by stroking the cornea from below upwards, and the fixation forceps and speculum were then removed, after the corners of the incision were cleared of iris with a silver stylet. The pupil was previously dilated with duboisine and the eye was anaesthetized with a four per cent. *fresh* solution of cocaine. She felt the operation, but the only painful part of it was during the iridectomy.

January 28th. Slight pain in eye, relieved with morph. sulph. gr iii., Hydr. chloral  $\mathfrak{z}$ ij, croton chloral,  $\mathfrak{O}$ ij, syrup,  $\mathfrak{z}$ ij. S. Tea-spoonful every hour until easy. Took two doses.

January 29th. Dressed eye again with cotton and bandage, and to-day applied, ext. belladon. and morphine salve, about temple, over brow, side nose and below lower lid, and dropped into eye, morning and evening, solution atropine sulph. gr.j. to aq.  $\mathfrak{z}$ . Some supra-orbital soreness and pain. Under this line of treatment, and applications of hot cotton pads over the bandages to eye, this rheumatism and irritation passed off slowly. There was no iritis.

February 16th. There is a moon shaped central opening in the anterior capsule.

March 17th. With + D 12.0 sp.  $\bigcirc$  + D 2.25 cy. ax.  $90^\circ$  vision rem. = D  $\frac{4}{5}$ : and with + D 15.0 sp.  $\bigcirc$  + D 2.25 cy. ax.  $90^\circ$  V. prox. = D  $\frac{9}{10}$ : Snellen. This case presents the essential features of M. Galezowski's operation, the laceration of the capsule with the point of the knife, but differs from it in the position of the incision, the iridectomy, the use of atropine and the non-employment of disinfectants, and the non-removal of forceps and speculum until the operation was completed. The case illustrates that an iridectomy can be done during such an operation and after such an incision, and that it was not necessary to introduce the cystotome to lacerate the capsule.

CASE IV. Mr. Thomas P., aged 62 years, a glass-flattener by profession, and rather a delicate man. He has double cataracts non-traumatic, and the left was mature and was removed March



23, 1886, by Galezowski's method, modified somewhat. The crucial incision of the capsule was made. I did not remove the fixation forceps and speculum until the escape of the lens; pressure was made above the apex of the incision just back of the sclero-corneal junction with the curette, followed with gentle pressure with the unremoved forceps below in my right hand; and when the lens had engaged in the incision, the curette was withdrawn from above and used in stroking the cornea upwards. The speculum and forceps removed, the upper lid was elevated, the patient directed to look downwards, and the anterior chamber washed out with (warm 98.5°) a 2½ per cent solution of boric acid, pure, in distilled water, which had been filtered. This was placed in a tin cup, to the bottom of which was attached a rubber tube, and the latter was secured to a Bowman's cataract suction apparatus, the cannula point of which had been cut off square and rounded smoothly. The cup, tube and instruments were well washed out with hot water, and then with some of the boric solution, and the cup was held by an assistant about two feet above the recumbent patient. The iris being in the wound the stop-off of the tube opened, the end of the canula was not at once introduced into the anterior chamber, but was held over the incision and near it. The flowing fluid caused the iris to reenter the anterior chamber, and then the canula was introduced while the wash was flowing within the area of the little column of water, but directed not towards the iris, but towards the inner surface of the cornea and down to opposite the level of apex of the cornea, the barrel of the canula resting against the incision of cornea gently. This brought out some cortex and caused the pupil to contract well. This done the canula was withdrawn, the angles of the incision were clear and the pupil round and free from capsule, when the eye was freely bathed in the conjunctival sac and over the cornea with M. Panas' disinfectant fluid, which is as follows:

R Hydr. biniodidi, grs.  $\frac{7}{16}$ .  
 Alcohol, 3 v. (by weight).  
 Aquæ Dist. f. o j +  $\frac{7}{16}$  pint.

Dissolve the mercury in the alcohol and add the water in a large bottle. Shake thoroughly for twelve hours and filter.

The solution of boric acid has been recommended by Wicherkiewicz, for the same purpose. See *Ophthalmic Review* Jan'y 1886, p. 18, from the *Klin. Monatsbl. fuer Augenheilk.* Nov. 1885, p. 478. My apparatus is more simple, however, than his. But this gentleman like myself and others are indebted to W. A. McKeown who first used tepid water for this object. See *Ophthalmic Review*, vol. iv., page 345.

After bathing the eye with M. Panas' disinfecting fluid for half a minute, a FRESH SOLUTION of eserine was dropped into the conjunctival sac. The eye was then dressed with cotton and dry bandage, which were not removed for forty-eight hours. The eye was then opened and wound found united, and then the eye was again bandaged. The pupil was dilated before the operation with a solution of duboisine made as follows:

R. Fl. ex. duboisine (Parke, Davis) ʒi. Add dialyzed iron ʒj M. and put into a bottle and shake at intervals for twelve hours. Then filter and add aqua distillata until a drop for the filtrate gives no color with a drop of nitric acid. Then evaporate on a water bath to ʒi; put into this a piece of camphor the size of a pea.

This is cheaper; the fluid extract costing \$2 $\frac{1}{10}$  per lb., and its effects are better than any salt of duboisine I have used.

I used in this operation A FRESH SOLUTION of cocaine, fearing that *old* or even *recent* solutions might set up inflammation.

There was no reaction from the operation, and he might have gone home in a week had the weather permitted.

He left in two weeks, and will return soon to have his glasses adapted. He stated he did not feel the operation. No anæsthetic was given or mydriatics employed after the operation, and the eserine used but once. Another modification might be made in this operation. The incision was brought out 2 mm. from the upper border of the cornea, and was carried directly from the sclero-corneal junction upwards and out at 2 mm. from the cornea above. But the incision can, with propriety, be made to skirt the corneal junction in its entire extent, in order to secure greater vitality for the flap in that situation. This principle of varying the position of the incision, causing it to enter the sclero-corneal junction or even the sclerotic in the aged and

feeble, has been urged by the elder Chritchett and later by his son; while in the young and vigorous, they claim the incision may be wholly within the cornea, and thus, they hold, sloughing of cornea is avoided and cicatrization favored.

May 22, 1886. The patient returned to-day. The corneal wound has healed with accurate coaptation, and I am unable to detect any abnormal curvature of the cornea, and there is no astigmatism. The pupil is round, active and free from adhesions. The anterior capsule is freely open, but there is a slight clouding of the posterior capsule, but which, at present at least, does not demand operation. With  $+D\ 15.0$  sp. V. Prox. =  $D\ \frac{0.8}{0.20}$ ; and with  $+D\ 9.0$  sp. V. Rem. =  $D\ \frac{4.0}{24.0}$  Snellen.

I omitted to state that in the second case I washed out the anterior chamber with lukewarm filtered distilled water, thrown in gently with a hypodermic syringe, the canula of which was squared up and rounded smoothly at its distal end. It will be remembered that in that case there was also some clouding of the posterior capsule as well as in the last case, and it occurs to me if by possibility this could have been induced by the fluids introduced into the anterior and posterior chambers and reaching the posterior capsule, and inducing the clouding. But it is well known such a result is not uncommon after extractions in which irrigation was not thought of.

It may be added that I have done several other cases of this form of extraction, but as iridectomy was performed, I do not report them, although the results were good. I have not adopted this operation in other cases of extraction, hence I have only four cases of this class to report.

June 21, 1886. Since writing the above I find Mr. Galezowski, see *Recueil D'Ophthalmologie*, April No., 1886, p. 199, uses a four per cent solution of cocaine every two minutes for about ten minutes, and used one hour before the operation, and does not use any other mydriatic. He believes that this agent sometimes favors supperation of the corneal flaps especially in the aged, feeble and cachectic. He also speaks of this agent inducing a want of coaptation of the flap, which he claims is remedied by the application of his gelatine wafers over the corneal incision. He urges as little of this agent as will induce anaesthesia.

It is not impossible that if the cocaine is used *immediately* before the operation, and the duboisine or atropine several hours before, and that the washing out of the anterior and posterior chambers, and the conjunctival sac with disinfectants, will at least, diminish these risks from cocaine. It may be, too, that the hydrochloric acid of the muriate of cocaine can act unfavorably, and that the benzoate of cocaine would be less injurious than several parties have claimed this agent to be.

## TWO CASES OF STRABISMUS WITH CHOROIDAL ATROPHY.

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In the *New York Medical Journal* of April 4th, 1885, Dr. F. C. Riley reported a case of hypermetropic convergent strabismus with choroidal atrophy, which he was able to correct by glasses. Since the appearance of this report, two cases, with similar complications, have come under my observation. A history of these cases and the results obtained from treatment are here presented.

CASE I. John M., aged 9 years, first came under my care in March, 1885. The father told me that the squint was first noticed when the child was one month old. He was a delicate child and often had spasms. He had passed through the ordeal of most of the acute diseases of childhood, and to these were attributed his small stature and delicate frame. When the squint was first noticed, one eye and then the other would deviate from the visual axis, but since his fourth year, the left has remained permanently strabismic. He has considerable difficulty at school in keeping up with his classes, and seems to be dull, or indifferent to such questions as are put to him.

On examination, I found convergent squint of the left eye. When the right is covered, the left moves outward and seems to fix centrally on the finger, as soon as the right is uncovered, the left again takes on the squint.  $V. R. = \frac{20}{L}$ .  $L = \frac{8}{C}$ . As the day was dark and the boy indifferent to my questions, I was unable to tell whether any improvement was obtained by glasses. With the ophthalmoscope, the right eye appeared hypermetropic, and presented two small patches of choroidal atrophy, with irregular pigmented margins above and to the inner side of the disc. In the left eye there is a large plaque of choroid absent

between the disc and the macular region, and encroaching somewhat upon the latter. In addition to this, are several smaller patches and pigmented spots scattered over the fundus, being especially marked on the nasal side of the disc. Atropia was ordered and the patient was instructed to return in two days. When he returned, the eyes were fully under the influence of the mydriatic, and there was no convergence. After some difficulty (due to the boy's stupidity), I found that in the right eye, the vision could be brought to  $\frac{20}{xL}$ , with  $+\frac{1}{2}$ . In the left, there was doubtful improvement with  $+\frac{1}{2}$ . Again, ophthalmoscopic examination was made with the hope that it would assist in determining the strength of the glass. He was eventually given  $+\frac{1}{2}$  for each eye. The atropia was ordered to be continued, proper glasses to be procured and the eyes to come from under the influence of the mydriatic with the glasses in position. I saw him again in one week. At this time he was wearing the glasses, and the pupils were beginning to assume their normal size. There was now no convergence. Vision was the same as when last noted. He came several times during the following month, and when last seen, there was parallelism. During the last few days I have made search for the boy, that I might see if any improvement in the acuity of vision had taken place, but his parents had moved from their former place of residence, and none of the neighbors could tell me where.

CASE II.—Lulu P., aged 12 years, came to me from the interior of the state Oct. 18, 1885. She had had convergent strabismus since early childhood. For several years the squint was alternating, but, at this date, the right turns inwards. The child, though mentally bright, had considerable difficulty at school in consequence of her defect of sight. She had been the subject of severe headaches, which, of late, have become more frequent.

On examination V. L.  $\frac{20}{LXX}$ ; V. R.  $\frac{3}{c}$ . No improvement with glasses; ophthalmoscopic examination showed old choroiditis. In the right eye there was a large circular spot involving the macula, its edges are short cut, and it seems as if a piece of choroid had been punched out. There was only slight pigmentation of the edges; over the periphery of the fundus were several smaller spots of atrophic choroid. In the left eye only one



spot denoting atrophy could be found, and this was low down in the margin of the field; besides these, were several pigmented spots without atrophy.

I ordered atropia, and, on the 20th, found that the left eye could be improved to  $\frac{2}{1}$  with  $+\frac{1}{12}$ . The right showed no improvement with glasses. The atropia seemed to lessen somewhat the angle of convergence. I ordered  $+\frac{1}{12}$  for each eye, to be worn constantly. She was seen at intervals until Dec. 8, but the squint showed no further improvement, and, as the father was anxious to have the defect corrected, I divided the internal rectus of the right eye under ether in the presence of Dr. John G. Cecil. Very little dissection of the conjunctiva was made, the opening being afterwards closed by a suture. The immediate effect seemed to be parallelism, but, on the following day, there was slight divergence. The atropia and glasses were now discontinued, and, on Dec. 23rd, the divergence had given place to slight convergence. And, as the child clamored for her glasses, she was allowed to commence their use again.

The father states at this writing that the severe headaches of which the child previously complained, have not recurred since she has been wearing the glasses. She says they give her great comfort, and protests strongly against any suggestion of their discontinuance.

If the destruction of the choroid had not been so extensive, I am inclined to believe that the result in this case would have been as good as in the first, since, when the atropia was used, there was considerable lessening of the deviation.

I am disposed to assume that the deviation in the first case was due to the error of refraction, the choroidal changes playing a secondary part; while in the second case the choroidal change was the prime factor. The error of refraction, however, did have some influence, as was shown by the diminution of the amount of convergence under a suspension of the accommodation.

In a single uncomplicated convergence I suggest to the patient the possibility of a cure by the proper adaptation of glasses, and in such cases correct the entire amount of ametropia, and order a continuance of the mydriatic until the glasses are properly adjusted.



## ON THE HISTOLOGY OF TRACHOMA.<sup>1</sup>

BY ADOLF ALT, M. D.

1. Extracts of a paper read before the St. Louis Microscopical Society.

Trachoma, granulated eyelids, being so frequent a disease, I thought it might be interesting to you to see some specimens of different cases of trachoma, which I have obtained from folds of conjunctiva, taken from the living subject.

As you know, Sattler thought he had found the trachomacoccus, but had to take it back as well as his jequirity-bacillus. In my remarks no further reference will be made to the yet undiscovered parasite, which may, perhaps, be found to bring about the disease of the conjunctiva, known as trachoma, and will simply give you a few points on the histology of a trachomatous conjunctiva.

You all know that the normal conjunctiva consists of an epithelial coat, adenoid tissue (made up of a loose net-work of fibres, between which we find a number of lymphatic cells and the meshes of which are lymphatic spaces), and of a more fibrous layer where it is attached to the underlying tissues. The surface of the conjunctiva is not smooth, but shows numerous ridges and indentations. These are especially developed on the palpebral conjunctiva, and in the fornix.

The trachomatous conjunctiva is thickened, often to an immense degree. This, as you will see, is chiefly due to a diffuse infiltration of the adenoid tissue with lymphatic cells. For each and every one of these specimens you will see, however, that aside from the general diffuse infiltration of this tissue you have here and there, more or less numerous aggregations of round cells, which are round, oval or pear-shaped, and apparently like miliary lymphomata. These cell-aggregations are what has been considered the true character-

istic of trachoma, and what has received the inappropriate name of trachoma-follicle. You will plainly see, that we have not to deal with a true follicle, and that this conglomeration of round-cells is not lying, so to speak, in a membranous sac. What might appear as such in some of the specimens, is simply the fibres of the adenoid tissue which have been pressed aside, and closely together, during the growth of this so-called follicle. The peripheral cells of this lymphoma-like aggregation are more densely packed than those that are centrally located, so that in specimens stained with hæmatoxyline you will see a dark peripheral ring. The cells themselves have nothing peculiar; they are simply lymphatic cells, and between them you will see a small amount of intercellular substance. The cells lying near and in the center sometimes appear larger than the peripheral ones.

It has been stated that the trachoma follicles contain no blood-vessels, and this has been urged as a proof, that we have actually to deal with a closed follicle. Nearly all of these specimens will, however, show you that the follicles are traversed by blood-vessels and sometimes by a great many. In the neighborhood of the follicles we often find enlarged lymph-spaces and canals.

During the progress of the disease the pressure of the cells may lead to the destruction of the epithelial layer covering the follicle, and to a spontaneous evacuation and healing in the manner of an abscess. Or the malnutrition, consequent upon the pressure, may probably cause the cells themselves to undergo a regressive metamorphosis (of such a process I have no specimens), or they may finally be absorbed.

These conditions, as detailed, are the same, only differing in degree, in the so-called follicular catarrh, the true trachoma, and where we have so-called solitary follicles.

Some of the specimens I have procured from rabbits which I inoculated with the secretions from the human trachomatous conjunctiva.

The minute ridges and indentations of the surface of the conjunctiva, I mentioned before, are, of course, all covered with an epithelial coat. During the progress of the disease and the irregular swelling of the conjunctiva, these indentations are displaced

and distorted, and sometimes even large parts of them are cut off, and now appear buried in the depth of the tissue. These epithelial formations have, by a number of authors, been described as newly formed glands, and this process of new formation of glandular tissue has been taken for something characteristic of trachoma. Aside from the fact, that there is no new formation of glands, I may state, however, that the cells of the epithelial coat are, undoubtedly, stimulated to hypertrophy, and thus the epithelial tissue found in the depth is usually much thicker than the superficial layer of the conjunctiva.

Histologically trachoma is then characterized by lymphoma-like cell-aggregations within a conjunctiva diffusely infiltrated with round cells. This condition distinguishes trachoma fully from other affections of the conjunctiva.

In a paper read before the A. M. A., the author explained the therapeutic effects of some of the drugs used in the treatment of trachoma. He gave it as his opinion, that we had empirically found those methods of treatment the best which bring about an *evacuation* or the *absorption* of the follicle.

Among the remedies which bring about an evacuation is jequirity. Specimens taken from eyes treated with jequirity powder show that the inflammatory process destroys the epithelial cover, and causes it be cast off, thus artificially opening the follicles. This is undoubtedly the anatomical cause of the strange grayish appearance of the "doomed" follicles after the application of jequirity. When it is stated by Dujardin that jequirity is acting more on the "granular keratitis" than on the granular conjunctivitis<sup>1</sup>, he is undoubtedly mistaken.

The author further stated that he practiced now frequently and with seemingly excellent result, the excision of the most prominent fold of the swollen conjunctiva. He could state that this little operation not only caused no deformity, but undoubtedly helped to shorten the process of healing by absorption.

In the last number of the *Archives of Ophthalmology*, our esteemed collaborator, Dr. Hotz, gives as his method of treat-

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<sup>1</sup> See translation this Journal, May, 1886, page 132.

ment the forcible expulsion of the contents of all follicles by pressing them out like comedones between the fingers or between the blades of a blunt iris forceps. The writer of this article has not yet tried this method, yet it seems to him to be correct in principle.